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# AN EXPERIMENTAL STUDY OF THE PERCEPTION OF OILINESS

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## *Introduction*

In reviewing the literature on 'touch blends', we found that the only experimental work on the subject is that of M. Bentley.<sup>1</sup> Upon repeating Bentley's experiments, in which he paid especial attention to the perception of liquidity, we became interested in the 'oily' experience, which seemed to be a true perception, on a par with Bentley's perception of wetness. Accordingly, we determined to follow up the hint obtained in our brief experimentation by a thorough study of oiliness. First, we sought to analyze the perception into its sensory components, in order to determine the compulsory conditions for the oily perception. Secondly, we wished to synthesize our components in such a way that our *Os* should be *compelled* to perceive oiliness, even though, physically speaking, there was nothing oily present in the stimulus.

## I. *Analysis of the Perception of Oiliness*

We spent four months of the academic year 1920-21 in analyzing the perception of oiliness, and the following two months in synthesizing. There were four *Os* in the first half of the work: Dr. A. H. Sullivan (Su), instructor in psychology, Miss Lillian Cobbey (Co), assistant in psychology, and the Misses E. G. MacArthur (Ma) and S. Chapman (Ch), seniors and majors in psychology. In the second half of the work, we added a new *O*, Mr. J. P. Nafe(Na), a graduate student in the department, who served as a check on our synthetic conditions inasmuch as he had no previous experience in analyzing the oily perception.<sup>2</sup>

The *O*, blindfolded, sat with right arm resting comfortably on a raised arm-rest, with the middle finger of the right hand extending downward through a hole in a board which served as a finger-rest and as a means of keeping the finger perfectly still.

<sup>1</sup>M. Bentley, "The Synthetic Experiment," this JOURNAL, ix., 1900, 414 ff.

<sup>2</sup>When the regular *E*, Co, acted as *O*, Mr. O. De Motte acted as *E*.

*E* said, "Now," and then slowly and evenly, by means of a pulley, raised a small cup, set on an inclined board, until the finger was immersed in oil up to the first joint. The finger remained immersed from 2 to 10 min., while the *O* described his experiences. The two *Os*, *Su* and *Co*, knew, of course, that oily substances would be presented for report at times, but they did not know at what times, since other liquids were run in as checks. The other three *Os* had not the slightest hint that oil was used, all of them coming to a realization of the oily experience with a certain amount of surprise, because they were more or less 'set' for water or a similar liquid, having had some practice in reporting upon wetness in another experiment which was going on in the laboratory.

### EXPERIMENT I

In our first experiment we used olive oil, kerosene oil, paraffine oil, and water. We asked our *Os* to report upon their sensory experiences, and then, if possible, to name the perception. We found that it was easier for the *O* if we allowed him to shift attitude several times during an experiment, now naming the perception, now reporting the sensory experiences on which the perception was based.

It became evident very soon that all our *Os* felt oiliness as a unique experience or true perception, not at all dependent upon movement. Always they analyzed this perception into warmth and light pressure. When the finger was first immersed in the oil the *Os* reported cold and pressure, and they named the experience 'wetness'. Then, as the finger remained in the oil, the temperature changed from coolness to warmth, and the pressure became 'snug'. Not, however, until these two qualities were properly fused or blended, did the perception become one of oiliness instead of wetness.

The reports ran very much alike for all *Os*. Examples are the following:

*Ch*, olive oil (30 sec.) "Cold and a little pressure, wet under the nail." (1 min.) "The finger is becoming gradually warmer and seems oily." (5 min.) "The pressure is light and even all around the finger; there is warmth too, and it feels oily."

*Co*, paraffine oil (30 sec.) "I feel nothing at all." (1 min.) "The finger is warm up to the base of the nail where there is a ring of pressure." (2 min.) "Now it feels oily; the pressure at the tip is getting tighter." (3 min.) "A warm pressure is blended well all over the finger, it is close-fitting, and it feels oily; that oily feeling seems to go all over me like a kind of nausea."

*Ma*, olive oil (30 sec.) "I felt it roll up on my finger, piling each roll on the last; that isn't like water." (1 min.) "It is cool and thick (because the pressure is more intense at the bottom of the finger)." (3 min.) "The pressure is air-tight and evenly distributed; there is a suffocating warmth too, and it feels oily." (6 min.) "There is that same warm even pressure, and it seems oily."

Su, paraffine oil (30 sec.) "One spot on the finger feels wet, where there is a spot of cold surrounded by a feathery, lacy pressure." (1 min.) "There is pressure, very weak in intensity, which I cannot localize; there is no temperature connected with the pressure, and it no longer seems wet." (4 min.) "Snug warmth blended with pressure; the finger feels very oily." After the cup is lowered, some oil still adhering to finger: (1 min.) "The warmth is rather intense, the pressure weak, yet I do feel pressure. Still oily." (3 min.) "Hardly any sensation, just a little warmth; no perception." (4 min.) "Now there is a little cold at the tip of the finger, and a slight pressure, and it feels wet. Wetness, for me, is as if the cold crystallized and touched the finger."

Su, olive oil (30 sec.) "Cold and pressure; wet." (1 min.) "Now there is warmth and pressure and it feels oily. There is one cold spot on the back of the finger where it feels wet: but the rest of the finger is oily. The warmth and pressure seem to be woven together into a fine texture." (2 min.) "All cold has disappeared; the warmth is quite intense; as the warmth increases in intensity the oiliness becomes clearer. The warmth is deep, under the skin." (4 min.) "Still feels oily although the warmth is now less intense than the snug close-fitting pressure." After cup of oil is lowered: "It does not feel oily now; it is more like having the finger extend into warm air; the pressure is not intense enough for oil."

The significant thing about these reports is not so much the fact that all *Os* reported warmth and pressure when they experienced the oily perception, although this is important, but the fact that they all reported a *blend* of the two sensations. In looking over the reports quoted, which are very much like the reports in general, we find such expressions as these: "a warm pressure is blended well all over the finger; it is close-fitting;" "the pressure is air-tight;" "there is a suffocating warmth;" "that same warm even pressure;" "snug warmth blended with pressure;" "warmth and pressure woven together into a fine texture." These descriptions, coming as they do from different *Os*, and in spite of the fact that oils of different weights and textures were used, show that the oily experience is indeed unique, being either a pressure that is so snug or air-tight that it is warm, or a pressure that is snug because it is warm; the fusion becomes as it were one sensory quality, so that the expression "warm pressure" very aptly describes it. The snugness does not mean an intense pressure, but a light, veil-like pressure that is close-fitting.

## EXPERIMENT II

When we had thrown in warm water as a check upon our *Os*' reports, in the first experiment, we found that all *Os* reported the oily perception at times when the stimulus was warm water. Our next problem was, then, to ascertain at what temperature water is perceived as oil, as well as to find, if possible, why oil and water of a certain temperature are perceived alike. Since oil was always reported as cool when the finger was first immersed we decided to use water at 32° C which should be gradually

heated, in order to simulate as nearly as possible the experience reported when oil was the stimulus.<sup>3</sup>

We found that all four *Os* perceived water at 32°C as 'wet'; but, as the temperature of the water increased, the wetness disappeared and the perception changed to 'oily'. Of course, there were slight individual differences in the temperature at which oiliness was perceived; but generally speaking all *Os* reported the perception when the temperature was 38° or 40° C. And always, when oiliness was reported, it was analyzed into warmth *plus* pressure. The following table gives a summary of the results for the four *Os*.

TABLE I. WATER SLOWLY HEATED ON FINGER

Obs	Temperature <sup>4</sup>	Observer's Report
Ch	32°-35° C	Coolness and light pressure; wet.
Ch	38°-40° C	Warmth and weak pressure; oily.
Co	32°-34° C	Cold; light pressure; wet.
Co	36°-42° C	Warmth; tight, close-fitting pressure; oily.
Ma	32°-36° C	Coolness; light pressure; wet.
Ma	39°-42° C	Warmth and light pressure; oily.
Su	32°-34° C	Clear cold, pressure in a ring and spots; wet.
Su	35°-39° C	Warmth and light pressure; oily.

We have chosen at random samples of the running reports of our various *Os* when water slowly heated was used as stimulus. The samples follow:

Ch (32° C) "There is cold and light pressure and it feels wet." (33° C) "The awful biting cold is disappearing; still wet." (34° C) "One spot on the tip of my finger is cold; the rest is warm, but the finger still feels wet." (36° C) "The finger feels cold and warm alternately; feels wet under the nail." (37° C) "Begins to feel warm all over." (38° C) "The warmth and pressure are blended now, and give a lovely oily perception."

Co (32° C) "Very cold and wet." (34° C) "The tip of the finger feels warm, with a snug, tight-fitting pressure which blends with the warmth and seems oily; but higher up on the finger, there is cold with a ring of pressure, and it is wet." (36° C) "Oily, with a warm close-fitting pressure all over the finger."

Ma (32° C) "Cold and lots of pressure; wet." (34° C) "Not so cold, and the pressure is getting light and tickly; still wet." (38° C) "Getting warm; still some pressure; feels moist rather than wet." (42° C) "Feels funny and heavy and warm and oily; it is a thin oil." (44° C) "Still feels slightly oily, but it is getting too hot and the perception isn't as plain."

Su (32° C) "There is a very intense, clear cold with little spots of pressure scattered around in it, and a ring at the top; wet." (34° C) "The wetness has disappeared except for one spot at the side of the finger nail."

<sup>3</sup>We tried various devices for gradually heating the water; first we used a kerosene lamp, then an alcohol lamp, and finally we perfected an electric heater which could be placed under the cup, and which gave the water a slow and gradual warmth.

<sup>4</sup>We must ask the readers of this Study to regard the temperatures as approximate only. We have reason to believe that the thermometer employed had a constant error, which we have so far been unable to determine.

(35° C) "Begins to feel like oil; there is a slight warmth and pressure." (37° C) "Oily; pressure and warmth blended." (38° C) "Very good oiliness; warmth and pressure cover whole finger." (39° C) "There is definite pressure and warmth, but it does not feel oily, neither does it feel wet. I cannot name the perception, but it is rather like glycerine."

The table and the reports give added support to our belief that oiliness is a fusion of warmth and pressure. The conditions for the fusion seem to be a warmth and a pressure of such an intensity that neither one stands out from the other; it is, in other words, a matter of about equal vividness of the two qualities. In the light of our results, we may say that water of a certain temperature is not 'wet' at all but 'oily'; the pressure in the 'wet' complex is not different from that in the 'oily' complex; the latter is called snug because it is blended with warmth.<sup>5</sup>

## II. *Synthesis of the Perception of Oiliness*

Now that we were certain of our analysis, we wished to synthesize the oily experience by stimulating a pressure spot and an adjoining warm spot with a 'dry' stimulus. We realized that our great difficulty would be to get a blend or fusion of the two sensations. We decided to work on the back of the hand where pressure and warm spots could be located easily.

## EXPERIMENT III

We found pressure spots and adjoining warm spots for all five *Os* and marked these with indelible ink. We tried a small camel's hair brush as a stimulus. This we plunged into hot water, dried quickly, and then applied to the pressure spot. This method did not prove very satisfactory, for it demanded great patience and care to suit individual sensitivity. Every *O*, however, reported the oily perception a goodly number of times. Of course none of the *Os* knew whether we were using oil or something else as a stimulus; when the writers observed, we sometimes used drops of oil in order to keep them in ignorance of the actual stimulus. The following table gives the results of Experiment III.

TABLE II. WARM BRUSH APPLIED TO A PRESSURE SPOT

Obs.	No. of Exps.	No. of times 'oily' perceived <sup>6</sup>
Ch	25	10
Co	12	10
Ma	20	10
Na	30	10
Su	15	10
Total	102	50

<sup>5</sup>One of the writers has often observed that a lukewarm bath actually feels oily if the eyes are shut and associations are, so far as possible, banished from the mind.

<sup>6</sup>Since our time was limited, we set ourselves the task of obtaining, if possible, 10 cases of correct synthesis from every *O*. Hence the number in the last column is always 10.

The reports ran somewhat as follows in all the experiments:

Ch, "It doesn't feel oily until the temperature and pressure are just right; then it seems oh! so oily, just like a drop of oil on the hand."

Co, "At first there is warmth around the edge with slight pressure in the center; then suddenly the two blend and give a lovely oily perception."

Ma, "Sometimes there is just warmth and pressure, but no perception of any kind. But when the two blend into a snug warmth, or a fairly tight pressure that feels warm, it feels oily."

Na, "I get pressure and warmth and then oily—it might be warm water—no, it is more like coal oil, or even a little heavier oil than that."

Su, "At first I feel only warmth and pressure; when they 'jump together' it feels oily."

#### EXPERIMENT IV

Not satisfied with the results of Experiment III, where we obtained the oily perception in 50% of the cases only, we now tried a temperature cylinder for stimulus. After heating the cylinder in boiling water, and drying it, we applied it to a hair which was near a warm spot. Our pressure sensation came from the pressure of the cylinder on the hair, while our warmth came from the radiant heat of the cylinder. Here we had not only a 'dry' stimulus, but also a stimulus which did not touch the skin at all. We found slight individual variations in sensitivity, but in all cases we found that a pressure on the hair great enough to bend the hair in the windward direction until it stood perpendicular, or a little beyond the perpendicular, was necessary before the oily perception was reported. The cylinder had to be within  $1/16$  in. of the skin in order to give the proper intensity of warmth. When we took care to secure these necessary conditions we were very successful in our results, the Os failing to report the perception only when the warmth or pressure was not of the right intensity, or, in a few cases, when the two qualities did not fuse.

The following table gives the results of Experiment IV.

TABLE III. HOT CYLINDER APPLIED TO A HAIR

Obs.	No. of Exps.	No. of times 'oily' perceived
Ch	15	10 or 66%
Co	15	10 or 66%
Ma	14	10 or 71%
Na	25	10 or 40%
Su	10	10 or 100%
Total	79	50 or 63%

Since Na entered the experiment late, and had no experience in observing before coming into the experiment, it may not be quite fair to include his results with those of the more experienced Os. If we omit his results from the table, we find that out of 54 experiments the four trained Os reported 40 cases (74%) in which they perceived oiliness.

Examples of reports in Experiment IV are:

Ch, "There is warmth and pressure; as soon as they blend it feels oily."

Co, "That is the best oily perception I have had. The oily perception comes rather suddenly, just as if a whole lot of oil were put on the hand; then later I analyze it into warmth and pressure."

Ma, "It feels like oil on a tiny spot no larger than one half a pin head."

Na, "It feels very oily on the back of the hand."

Su, "There is a smooth light pressure and a warmth which are blended. It is like a drop of oil. The drop of oil stays for some time." [The last sentence was reported after the cylinder was removed.]

It is evident from the table and the introspections that the heated temperature cylinder secures the compulsory conditions for the perception of oiliness.

The experiments above described were performed in ignorance of the work of R. S. Malmud (this JOURNAL, xxxii., 1921, 571 ff.), who attempted by simultaneous punctiform stimulation of warmth and pressure to obtain a perception of warm-wet. The attempt failed; and Malmud concludes, admittedly with some surprise, that "there seems to be no typical experience of warm-wet." She and her Os were, evidently, not looking for the perceptive meaning of 'oiliness'. We believe, however, that there are hints of 'oiliness' in certain of her reports, and especially in the experiments described toward the end of her paper. Malmud obtains, as we did, a true blend or fusion of warmth or pressure, and our positive result appears to be the complement of her negative conclusion as regards wetness. We hope that her experiments may be repeated with the possibility of an 'oily' quality or integration in mind.

### *Conclusion*

1. Oiliness is a fusion of warmth and light pressure; this fusion comes as a unique experience, being, it seems, an intermediate sensory quality rather than a perception.

2. Whenever we have the right combination of warmth and pressure, we perceive it as 'oily', whether the actual physical stimulus be oil, water, or a dry, warm temperature cylinder.

3. The compulsory conditions for the perception are:

(a) warmth of about  $38^{\circ}\text{C}$ — $40^{\circ}\text{C}$ ;<sup>7</sup>

(b) light pressure, such as that experienced when a hair is lightly stimulated;

(c) the two sensory qualities of such collocation and intensity that they are blended or fused into a "warm even pressure."

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<sup>7</sup>See Note 4 above.